# AMRDEC Technology As It Pertains To the Global War on Terror


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### US ARMY AMRDEC

**Systems & Warheads**


**39th Annual Gun & Ammunition / Missiles & Rockets Conference & Exhibition**

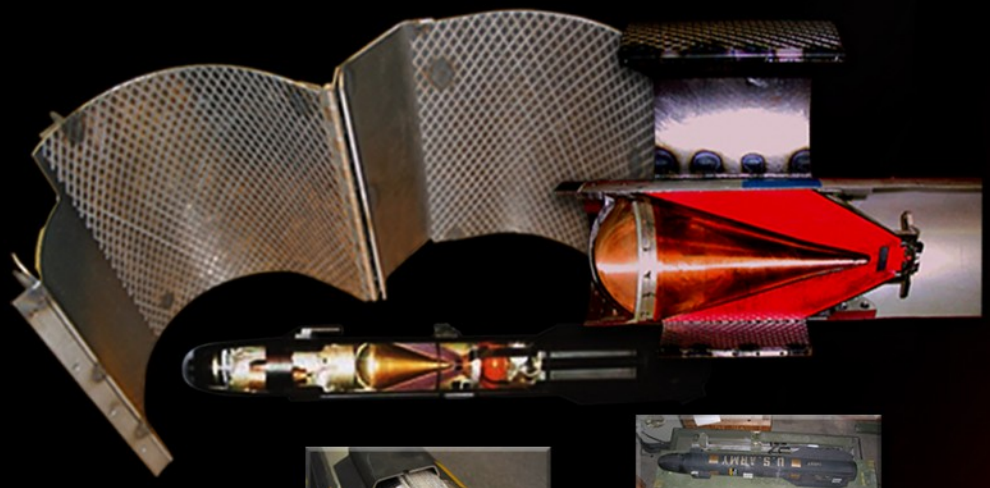
# Introduction

***AMRDEC Support of Global War on Terror***

- **Hellfire Mod-K Program**
- **Advanced Precision Kill Weapon System (APKWS)**
- **TOW Bunker Buster**

# AMRDEC

## HELLFIRE K MODEL MODIFICATION



# HELLFIRE AGM-114K

# "MOD-K"

# HELLFIRE Mod-K

**Objective:** Develop a Fragmentation Sleeve for Hellfire II Missile to Meet Urgent Operational Necessity

Baseline HELLFIRE II | Mod-K Fragment Sleeve

- **Development Concept**
  - External Modification to Current Fielded Missile System
  - Ability to Modify Missiles and Containers in Field Locations
  - Minimize Logistics Impact
  - Ability to Ship Modified Missiles
  - Field in Four Months

***Successful Fielding Resulted in Continuing Requests***

# Purpose of the Program

- Add An Anti-Personnel / Anti-Material Capability for Hellfire Missile System
  - Optimize Fragment Lethality Against Broad Range of Targets
  - Minimize Shaped Charge Performance Degradation
  - Meet Urgent Operational Necessity
  - Mission Capable – Limited Qualification

# Elements of Design

- Sleeve Design
  - Attachment / Hing
  - Fragment Size an Material
  - Internal Scoring
  - Adhesive
  - Missile Integration
- Adapt Shipping Container to Accommodate Missile Sleeve

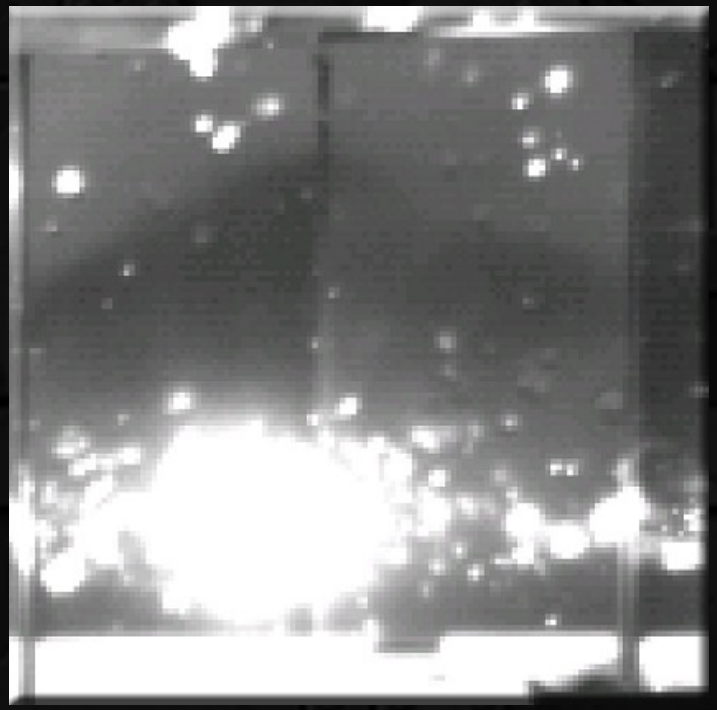
# Comparison of Baseline Missile & Steel Sleeve Fragmentation

Baseline Hellfire II

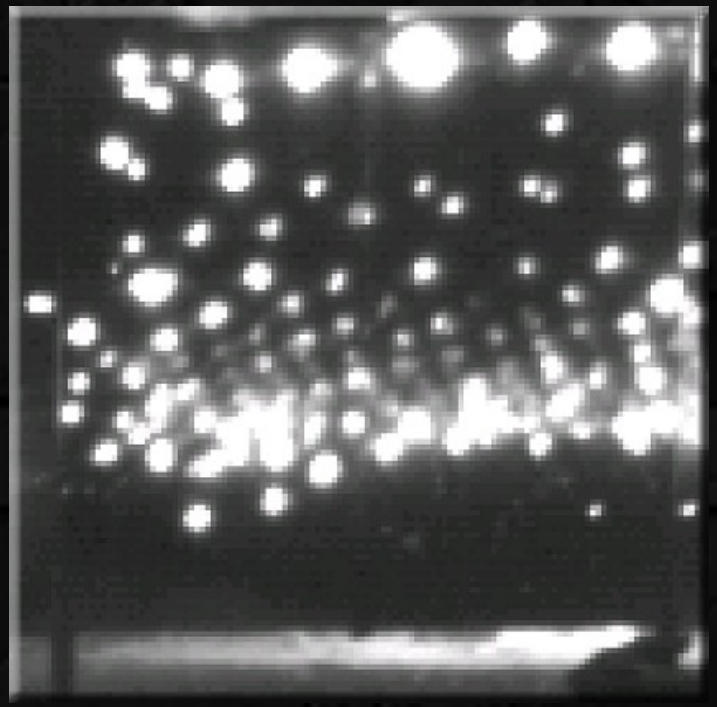
Mod-K Fragment Sleeve

# Comparison of Baseline Missile & Steel Sleeve Fragmentation

Baseline Hellfire II



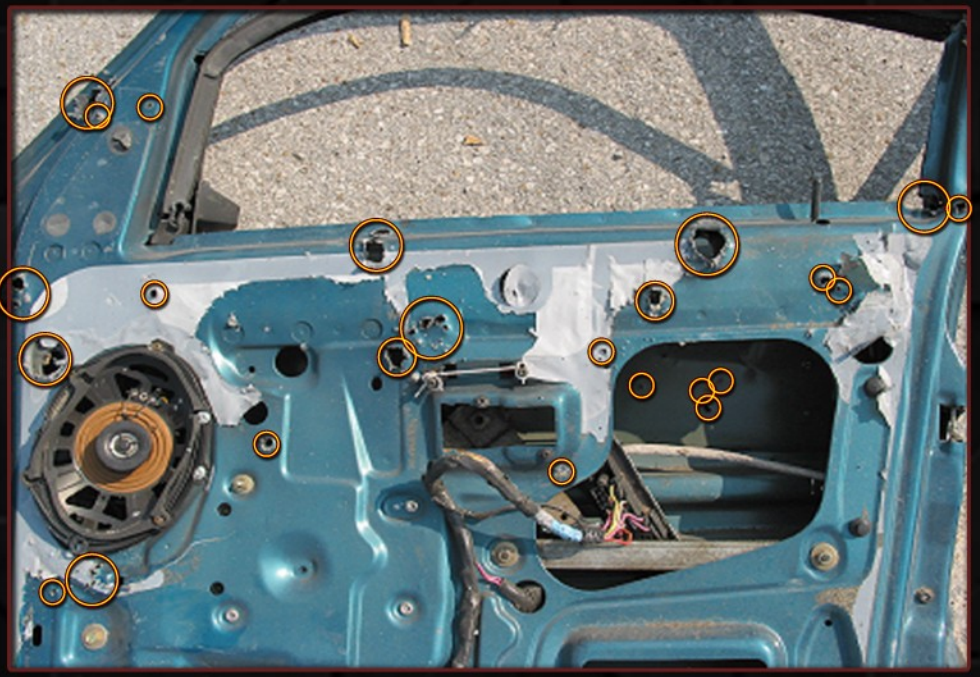
Mod-K Fragment Sleeve



# SUV Door Penetration

Multiple External Perforations

Several Internal Perforations



# Flight Test Results

- No Launch Rai
  Interference
- Aerodynamics
  Proven
- Flight Stability
  Proven
- Hit Accuracy Not

# Mod-K Conclusions

- Significant Increase in Number of Lethal Fragments
- Provides Capability Against Personnel and Light Vehicle Targets
- Sleeve Design Has Minimal Effect on RHA Penetration
- Fragment Sleeve Expands the Role of HF Missile for Targets of Opportunity

# APKWS

*Block I: Precision Guidance for 2.75” rockets*

*Block II: Warhead & Fuze Development*

# BLOCK I OBJECTIVES

**Develop, flight demonstrate, and integrate onto the AH-64 APACHE a low cost, accurate 2.75 inch guided rocket that provides a standoff range surgical strike capability against specified soft point targets.**

**Provides precision strike capability to HYDRA-70 rockets**

**Supports APKWS SDD Start**

**Requirements Summary**

- Hydra-70 range (1-6Km)
- HELLFIRE-like accuracy (~1m)
- Reduced fratricide (accuracy)
- Enhanced survivability (standoff)
- Reduced cost/kill (2x to 4x)
- Increased stowed kills (4x to 20x)
- Reduced collateral damage (>2x)
- Minimize platform mods (screw-on kit)
- Current logistics (screw-on kit)

**MNS APPROVED 02/96**
**ORD APPROVED 03/00**

# Expanded Target Set

## MOUT / Non-Hardened Field Structures

## MANPADS

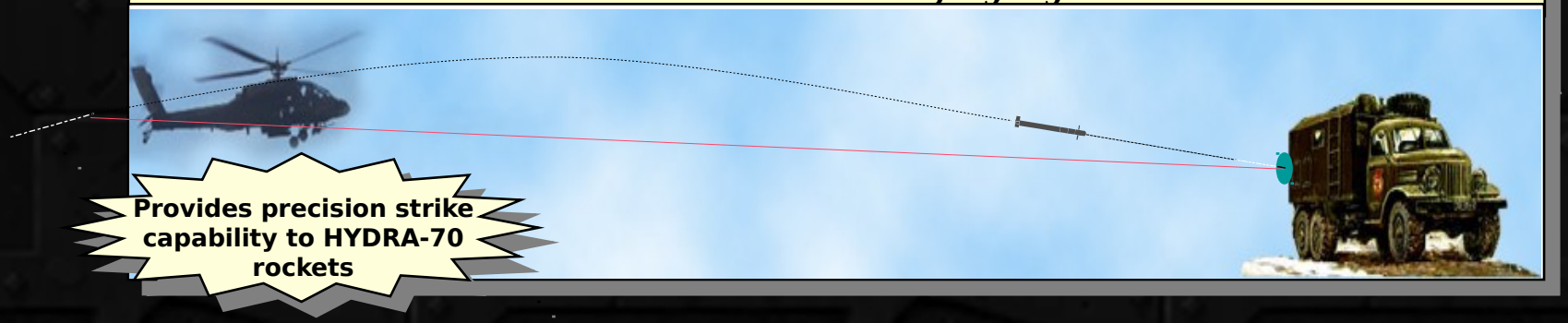
## Truck

## IFV

# TECHNICAL APPROACH

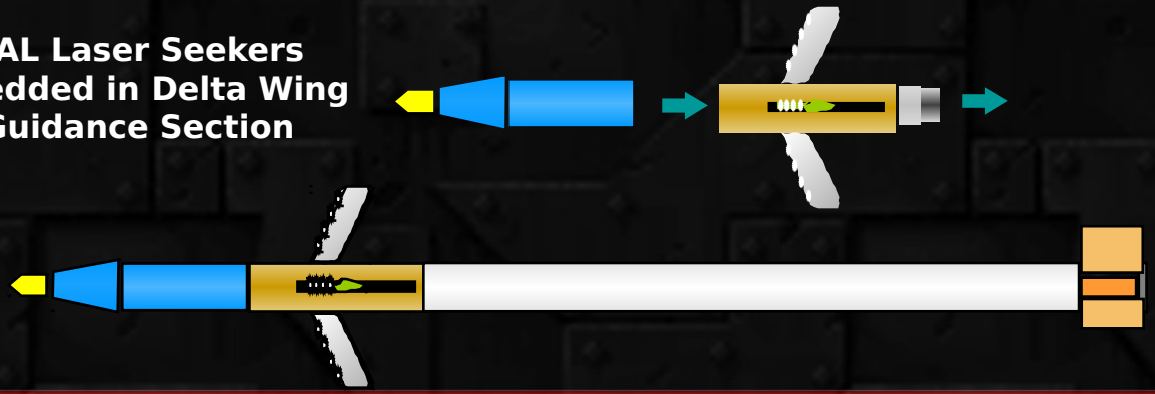
## Semi-Active Laser (SAL) Lock On After Launch (LOAL)

***Engagement of individual targets with high probability of single shot hit requires terminal or command to line-of-sight guidance.***




## BASELINE HYDRA-70 ROCKET

**SAL Laser Seekers Inbedded in Delta Wing Guidance Section**

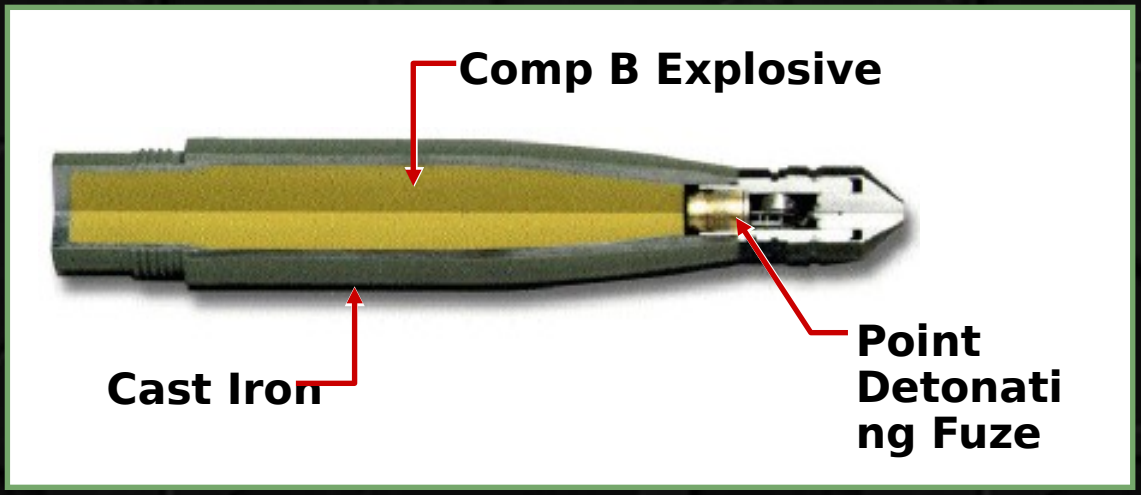


# Proposed APKWS Block II Objectives

**Integrate Technologies to Replace the Current M151 and M423**

- **Insensitive Munition Compliance Is Main Focus**
- **Improved Warhead and Fuze Lethality**
- **Improved MIL-STD 1316 Fuze**
- **Program Ends in FY05 with TRL 6 Prototype Designs and Supporting Test Data**
- **Low Risk Transition to APKWS Block II SDD in FY06**

# M151 Warhead Description




## *Current Design*

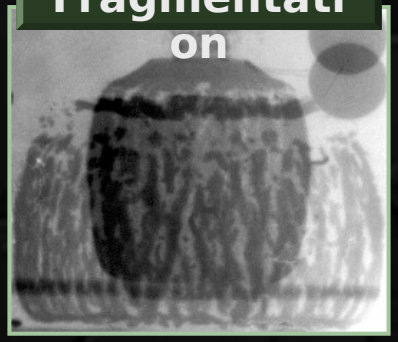
- Designed 40 Years Ago
- 65% of Fragments less than 5 grains
- Narrow Spray of Fragments
- Impact Fuze

## *Potential Improvements*

- Improved Fragmentation
- More Efficient Case Shape
- Enhance Blast Explosives
- Delay Fuzing for MOUT Targets

# Fragmentation Technology

## Natural Fragmentation



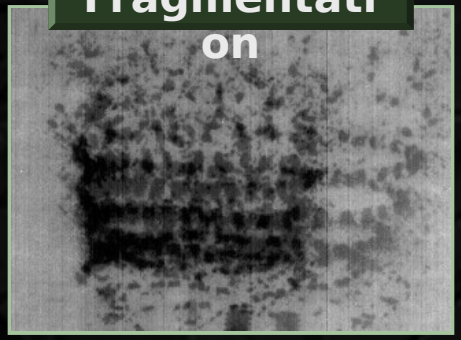
Wasted Mass/Energy

*Least Cost*

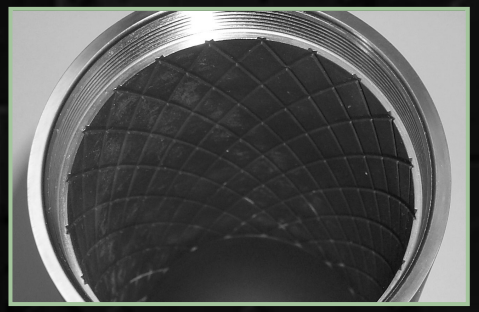
*Least Efficient*

M151 Warhead

## Embossed Fragmentation

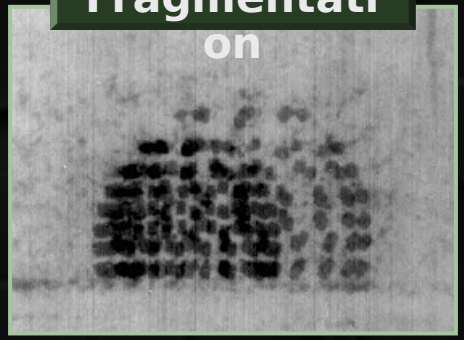


Less Wasted Mass/Energy
Improved Lethality,
Low Cost



Pearson or V-Notch Scoring

## Preformed Fragmentation



Efficient Mass/Energy
Optimized Lethality,
More Cost

*Most Cost*

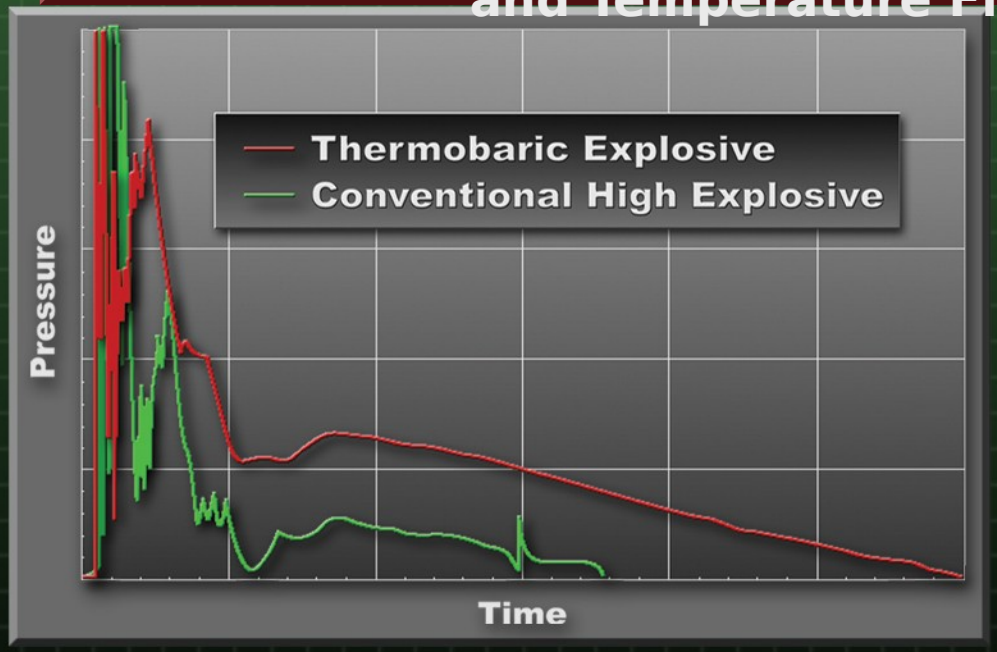
*Most Efficient*

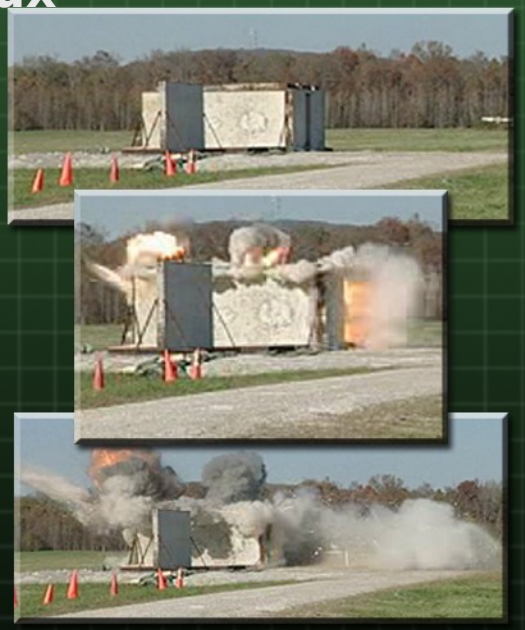
Tungsten fragments

**Optimization Balances Cost and Performance**

# Effects of Enhanced Blast

**We Want to Manage the Energy Release of the Explosive in Order to Maximize the Blast Impulse and Temperature Flux**



**Many Structures Survive High Load, Short Duration, Blast**

**Increased Impulse (Pressure Over Time) Causes Greater**

# Features of the APKWS Block II Fuze

- Integrated Development With Block II Warhead
- Meet Applicable Safety Standards (i.e., Dual Safe)
- Fuze May Include These Modes:
  - Point Detonating
  - Delay Detonating

**Lethality Drives the Fuze Requirement**

# APKWS Program Summary

- Design for IM
- Enhanced Fragmentation
- Enhanced Blast
- Dual Safe Fuze

***Next Step:*** **APKWS Block II Warhead and Fuze Program Will Provide the Capability to Defeat the Current and Evolving Threat**

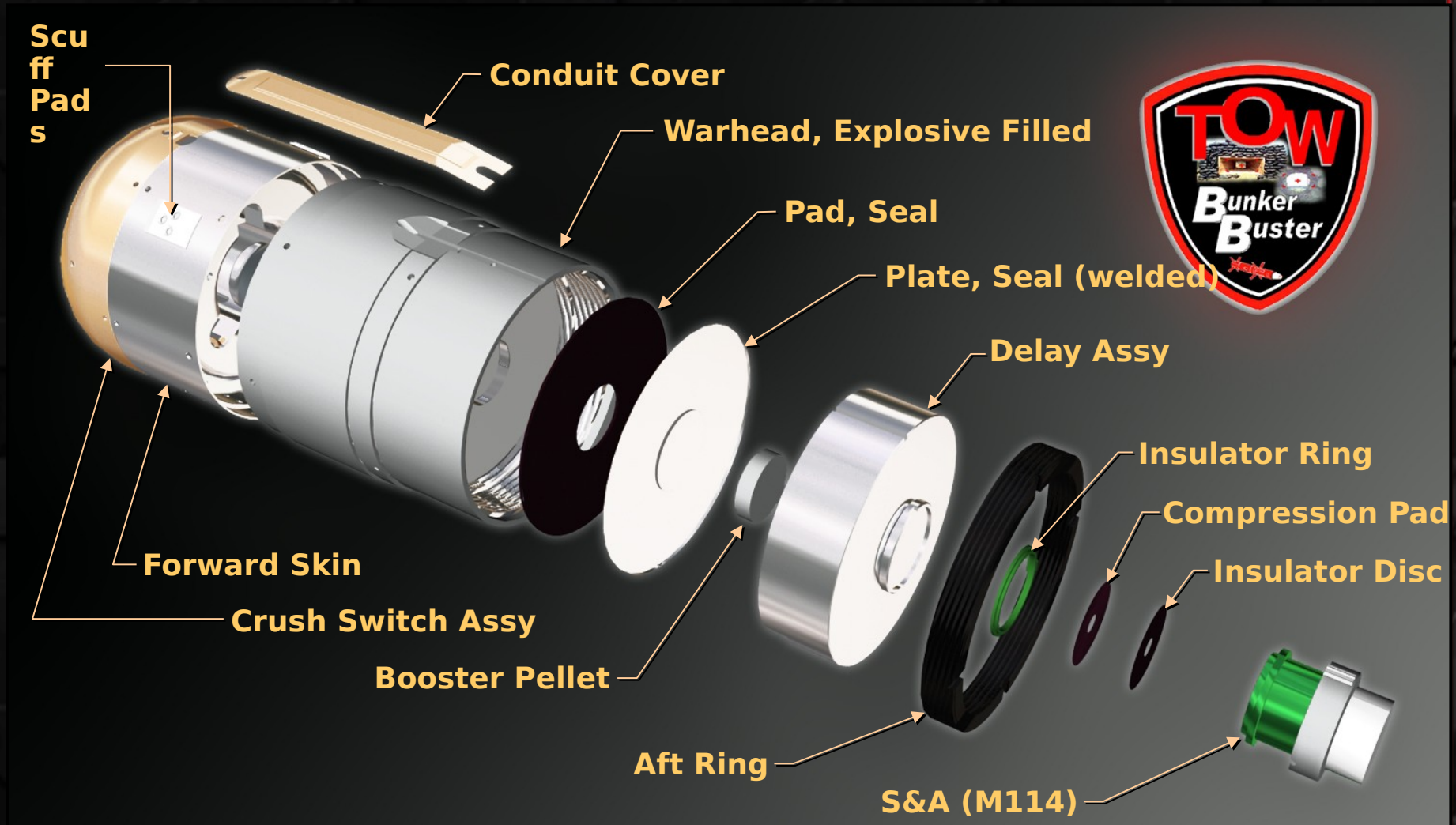
# TOW Bunker Buster

**Objective:** Provide Stryker ATGM with capability to breach masonry walls and defeat bunkers until Mobile Gun System becomes available.

- **Systems & Warheads Led Effort**
  - 12 Months R&D
  - 3 Months Production
- **Development Concept**
  - Designed Warhead
  - Missile Integration/ Retrofit
  - Warhead and Missile Test
  - Hardware Fabrication
  - Developed TDP
  - Led Production Effort

***500 Missiles Delivered on Schedule and Within Budget***

# TOW BB Warhead



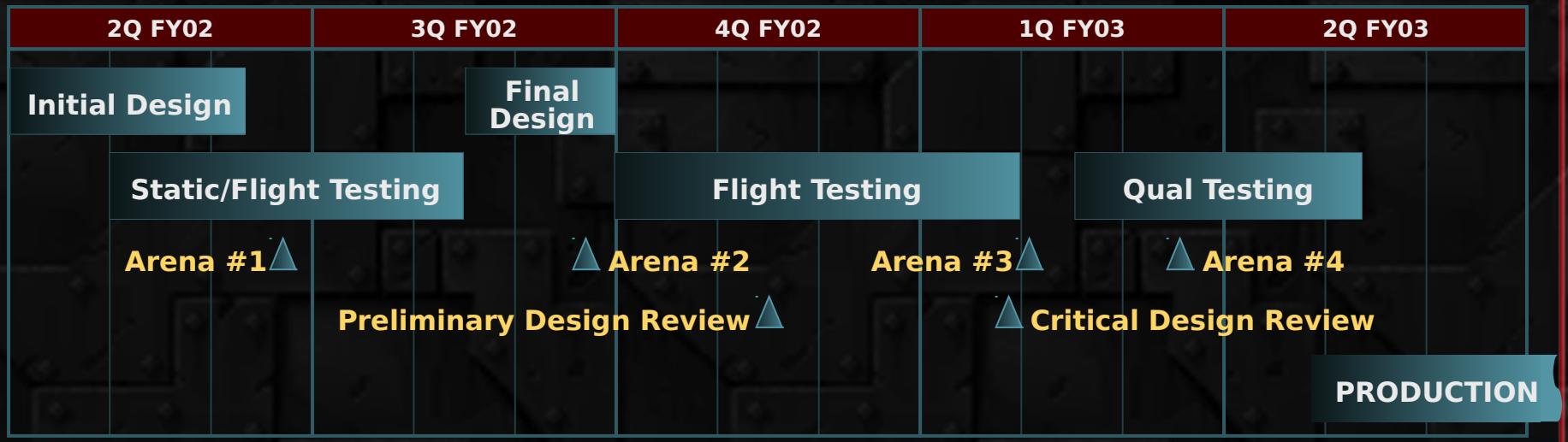
# TOW Bunker Buster

## Major Accomplishments

- Designed HE Bulk Charge Warhead
- Designed Fuze Delay Assembly
- Integration Resulted in Negligible Effects on Flight Performance
- Testing and Qualification
- Production Completed by May 03

## Opportunity

- Thermobaric Variant



# TOW Bunker Buster – Wall Engagement

# TOW Bunker Buster – Building Engagement

# TOW Bunker Buster Program Summary

- Quick Reaction Program
  - 12 Months R&D
  - 3 Months Limited Production at Army Depot

- Currently Fielded for Stryker Brigade
  - 500 Missiles

- Primary Mission to Support MOUT Wall Breaching

# AMRDEC Support to Global War On Terror

- **Expertise With Army Precision Guided Missiles Enables Quick Reaction Modifications to Support Unique and Urgent Mission Requirements**

- **Prototype and Limited Production Capability**

- **Working Relationship with All Missile Prime Contractors and Other Stakeholders**

# TOW Bunker Buster – Bunker Engagement